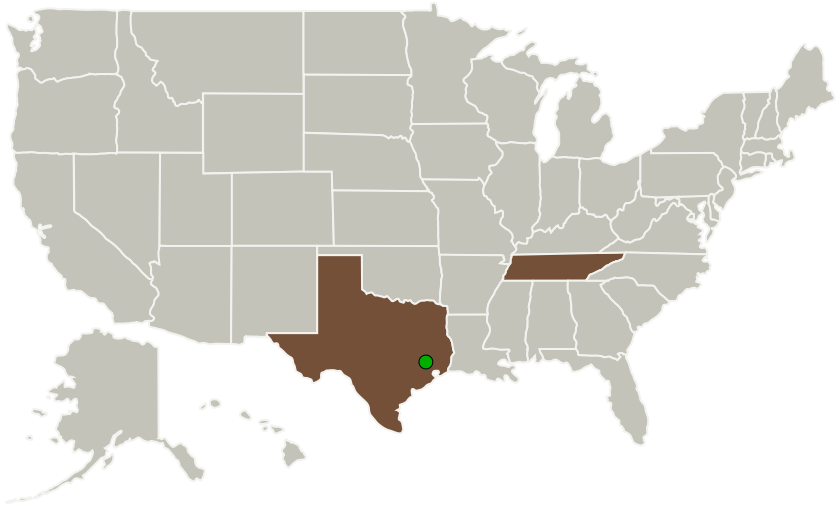
Reliable Actuator for Cryo Propellant Fluid Control, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

Cryogenic fluid handling applications require a reliable actuation technology that can handle very low temperatures. A novel EM hammer drive technology is proposed for use in cryo-propellant fuel storage and regulation valves/devices. In addition to high force, the new drive technology offers potential advantages for miniaturization, reduction of heat load, and lower cost as compared to traditional electromagnetic actuators. Dynamic Structures and Materials (DSM) proposes to focus the Phase I innovation on the development of a hammer drive actuation mechanism that will take the EM oscillatory power and produce continuous linear motion for operation at cryogenic and extreme environments. DSM has already demonstrated operation of its high force linear motor actuators at temperatures down to 77 K. The proposed actuator should operate from approximately 4 K to 400 K and should provide very low or no outgassing as well as operational capabilities in hard vacuum. The technology is proposed for applications in the cryo fluid management, pressure and flow control, and driving operational equipment and instruments. This proposal addresses DSM's approach to the development of flight-scalable demonstration components for the EM hammer drive technology.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Dynamic Structures and Materials, LLC	Lead Organization	Industry	Franklin, Tennessee
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Tennessee	Texas

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140299)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Dynamic Structures and Materials, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jeffrey S Paine

Co-Investigator:

Jeffrey Paine

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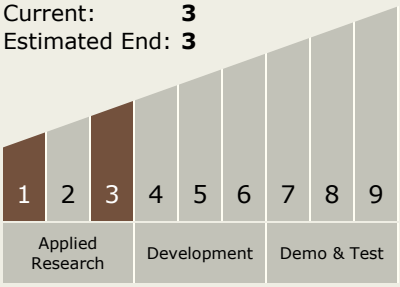
Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.1 Integrated Systems and Ancillary Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System